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Six Sigma Methodology Utilization in Medical Transcription-A DMAIC Process to Identify Six Sigma Projects

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Abstract : ***Six-sigma is a business-driven, multi-faceted approach to process improvement, reduced costs, and increased profit. It helps to improve quality of product and cost saving. Six sigma is considered to be one of the best quality improvement methodology applied successfully to organizational areas like manufacturing, production, accounting and finance, sales and marketing, information systems, human resource management etc. Six sigma is a project driven approach that concentrates on reducing variations, defects and improving the quality of products, processes as well as services. Basically Six Sigma measures 3.4 defects per million of opportunities (DPMO) and it operate on the concept of DMAIC. In the proposed work, guides how DMAIC can be successfully implemented in Medical Transcription to identify different Six Sigma projects by identifying critical to quality (CTQ).***

Keywords: Six Sigma; Medical Transcription, DMAIC, Critical to Quality (CTQ). Six Sigma projects.

1. **Introduction:** In 1987, Motorola developed and organized the six sigma process improvement Methodology to achieve "world-class" performance, quality, and total customer satisfaction. Since that time, at least 25% of the Fortune 200, including Motorola, General Electric, Ford, Boeing, Allied Signal, Toyota, Honeywell, Kodak, Raytheon, and Bank of America, to name a few, have implemented a Six sigma program (Antony et al. 2008, Hammer, 2002). These companies claim that Six sigma has significantly improved their profitability (Hammer, 2002). For example, in 1998 GE claimed benefits of $1.2 billion and costs of $450 million, for a net benefit of $750 million. The company's 1999 annual report further claimed a net benefit of more than $2 billion through the elimination of all non–value added activities in all business processes within the company (Lucas, 2002). Similarly, Allied Signal reported that Six sigma was a major factor in the company's $1.5 billion in estimated savings (Lucas, 2002). Six sigma has also enabled Honeywell to reduce the development time required to redesign Web sites by 84% for its specialty materials (Maddox, 2004).

Six sigma is more than numbers. That is a method and practice that provides tools for businesses necessary for accomplishing results from their processes and products. The main concept of Six Sigma is DMAIC (Define-Measure-Analyze-Improve-Control), method for analyses and improvement of business processes or operational process (Stoiljkovic V., et al. 2010). DMAIC itself has five stages: To Define opportunities, To Measure performances, To Analyze opportunity, To Improve performances and To Control performances. DMAIC is based on original Plan-Do- Check-Act cycle (PDCA) (Stoiljkovic V., et al. 2010).

Six sigma has been defined as a management strategy for improving product and process quality (Hahn et al. 2000, Harry and Schroeder, 2000, Sanders and Hild, 2000). It is also a statistical term used to measure process variations, i.e., how far a given process deviates from perfection, which causes defects. Six sigma works to systematically manage variation and eliminate defects--or to get them as close to zero as possible (Harrison, 2006). Six sigma initiatives have typically been implemented on shop floors of manufacturing firms to manage "process variations" (defects or errors), to improve quality and productivity (Revere and Black, 2003), and as a result, to increase the profitability of a company (Aggogeri & Gentili, 2008,
Anand et al. 2007, Lucas, 2002).
It has evolved into an efficient business process optimization. It has become one of the most important strategies for those companies who are pursuing the excellence of management. Thus, more and more projects have become pure Six Sigma projects since they were integrated with the methods, techniques, and personnel of Six Sigma management (Bertels & Strong, 2003).

Fornari & Maszle (2004) suggest that, the Six sigma concepts is adopted for those projects which are addressed quickly based on the priority. Firstly, projects are identified based on customer issues, business strategy, goals and objectives and priorities and then the projects are prioritized and selected according to business impacts and effort. Once project selected, the second stage is to manage them. Resources are assigned and the DMAIC methodology is used to find the best solution for the problem. Progress in each phase is viewed to ensure sustainable results before a new project is created. , Projects must be prioritized according to value and must be scoped and broken into manageable sizes. If a project has too broad scope, it can be divided into parallel projects and if it has too aggressive scope, it can be divided into sequential projects. The results of these projects must be carefully tracked.

2. ***About Medical Transcription:*** The Medical Transcription (MT) is one of the service sectors, and is one of many growing professions in the health care industry. It offers challenge and interest as well as flexible carrier paths. The specialty of MT is particular suited to individuals who like to work independently, learn continuously, pay close attention to detail, and produce a perfect product (Ettinger & Ettinger). An individual who perform medical transcription is known as a Medical Transcriptionist (MTs). A Medical Transcriptionist (MTs) is the person responsible for concerting the patient's medical records into the text form recorded dictation. The term transcriber describes the electronic the electronic equipment used in performing medical transcription.

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The MTs is a skilled typist, excellent at interpreting what they read or hear, and a good grammarian. They also have to have strong familiarity with medical language and terms. Further, MTs must be able to take what they hear and edit it, transform it, or make it logical without changing relevant details or medical information.

In MT there are three types of MTs, Junior Level (L_1), Proof Reader Level (L_2) and Quality Check (L_3). The L_1, is lowest level having one to two years of experiences, the L_2 is the middle employee having 3 to 5 years of experience and the L_3 is the top employee having more than 5years of experience, who does quality check of the files. The converted file can be uploaded to customer if the MTs guarantee that there is no error in that file or it can be uploaded to the next level of MTs. The Association for Healthcare Documentation Integrity (AHDI) has three classifications for medical transcription errors as: Minor Error, Major Error and Critical Error. Hence, in Medical Transcription process transcribing quality files is more important.

A minor error is an error that does not affect patient safety or document integrity and may be due to propositions or punctuations. For instance, a misplaced comma would not affect patient care nor would it render a medical transcription document or dictation report unsatisfactory. Sure, you want your medical documents pure and error free as possible, but some things just are not worth getting worked up over. A major error, by contrast, is errors that do affect the integrity of medical document but have an adverse impact upon patient care or the safety of a patient. If you misspell a medical term, for example, you may not endanger the health of a patient but you could make a medical document difficult to understand and meaningless to the professional who are required to interpret it. It's forgivable to a degree, but it isn't life threatening. Critical errors are critical in the stricter sense of the term, hence the name. These could have serious life threatening consequences for the patient or affect the quality of care for the patient. Any files having 98% points and above is called a quality file.

Accuracy = Number of lines – Number of errors.

Errors Per thousand Lines (EPTL) = Accuracy * 1000.

Some of the errors which likely to effect the MT process are: Grammar, Inappropriate Editing, Inappropriate Blank, Creative Transcription, Pertinent Omission, Wrong Medical word, Typographical, Capitalization and other type of errors.

In Medical Transcription, The service quality must reach the customer expectation or it should delight the customer. Unless the customer expectation quality meets, no customers willing buy or use it. When it comes to Total Quality Management (TQM) in the service industry, the most fundamental component is Service Quality (SQ), since the basis of service lies in physical equipment or service equipment and personnel interaction. Thus, to upgrade SQ, the services industries have adopt Total Quality Management techniques.

Thus more and more business corporations are now implementing quality improvement methodologies such as Lean Production, Total Quality Control, ISO, Total Productive Maintenance and Six sigma (Dahlgaard & Dahlgaard, 2006). Among these methodologies, Six sigma attracts more and more attention because it has evolved from a focus on achieving the quality level and process improvement using statistical tool to a comprehensive management framework for managing a business (Snee & Hoerl, 2002). Six sigma has become the synonym for improving quality, reducing cost and increasing customer loyalty (Bertels & Strong, 2003). Al-Mfraji O.R.M. & Almsafir M.K. (2012), says that Six sigma can be applied for Sustainable Competitive Advantage, Operational Efficiency and Effectiveness (OEE), Knowledge Making (KM) and to estimate Cost of Poor Quality (COPQ).

3. Six Sigma in Service Sector:

In the beginning Six sigma was popular in manufacturing industries and later it is started to implement in service industries also. As pointed out by authors such as Bank (2000), Banuelas & Antony (2002), Antony (2007), Taner et al. (2007) and Antony (2008), there are a few expected benefits from implementing Six sigma in the banking sector, such as: reduce customers' complaints, reduce internal call backs and so on.

Some of the benefits obtained by the financial institutions as a result of Six sigma implementation such as those obtained by Citibank Group and J P Morgan Chase (Global Investment Banking). These are: reduced internal call backs by 80 percent, external call backs by 85 percent and credit processing time by 50 percent and etc (Antony 2006). Six sigma applied to trace diffusion of cross-functional process improvement teams in Multi-National Banks (Strang & Jung 2009). Six sigma successfully implemented in Automotive Bank, (Zellner et al. 2012) and successful to reduce the cheque returns, (Jacobsen, 2011).

Six sigma applied in Engineering Educational Institution to quality in an Engineering Educational institution by eliminating the failure causes (Durgaprasad et al. 2012). Implementation of Six sigma in technical education has significantly resulted in increasing the passing rate of students (Prabhakar & Dinesh, 2010). The quality is assured through Six sigma by concentration on specific projects by working on particular software development process, (Agrwal et al. 2009). Six sigma was successful in reduce quality cost in food industry (Hung & Sung, 2011). Six sigma had helped to boost up time domain reliability in multi-stage service, (Raissi & Gatmiry, 2012). Six sigma was successful in Supply Chain industry (Moharana et al. 2012).

Six sigma had implanted in complaint handling (Abreu, & Sousa, 2012). Six sigma implemented to assess the job satisfaction in Indian foundry industry (Kumaravadivel & Natarajan, 2011).

Since the processes are having similarities in manufacturing and service, the concept got its applicability in service sector also. Service sectors being a vulnerable sector, for service to human, the zero defect approach will be the most suitable one, and the way towards the same being Six sigma, making Six sigma success becomes extremely important. To those who work as Six sigma practitioners in the organizations, Six sigma has become a way of life. Quality of care has become a

focal point in service sectors. Service sector systems continue to produce care that varies in quality. This leads to customer dissatisfaction as well as inefficient processes and output. As stated by Wang (2009), Six Sigma can be applied service sectors like, construction, health, telecom sector and other industries. This paper attempts to know how DMAIC of Six sigma concepts can be applied in Medical Transcriptions (MTs).

4. Developing DMAIC Methodology in Medical Transcriptions:

The study was conducted in one of the leading Medical Transcriptions Company in Bangalore. The company was not able to meet process quality in the Medical Transcription. The four moths' data is observed to assess causes for the quality. This was the definition of the problem. This problem was measured quantitatively and set different types Six sigma projects. The six sigma projects and projector charter is prepared by observing six month previous data, the business case is developed to increase in the MT business in the coming months and requires a proportionate increase in production and quality performance. Opportunity here would be to increase process performance in terms of quality.

The different types of projects were identified by observing past data are: ***Quality improvement projects*** (to minimize the errors), ***Productivity*** (to increase lines per hour), ***Employee Recruitment projects*** (to recruit new MTs and to identify the reasons shortlisted MTs does not reported) and ***Account or Client specific project*** (to address specific reasons). The causes for the above mentioned projects are identified based on the minor, major and critical errors and frequency of the errors by considering the different levels of MTs. A project aimed at incorporating the voice of the customer (i.e. customer's needs) and Six sigma level targets into the design of products, services or processes and improving quality. Six sigma improvement models mainly have five phases: Define Measure, Analyze, Improve and Control (Sleeper, 2006).

4.1 Define opportunities:

The Define phase is to make clear understanding of scope and objective to publish project charter and problems; all relevance stakeholders have been understood. Also, the project purpose and scope will be defined during the phase. One of the key major success factors of Six sigma project is that, starts with an understanding of what service processes are critical to MT in achieving these objectives. These are also called the critical to quality (CTQ). The cost of service delivery process is an important index and tool that makes to evaluate the process based on and scoring the mentioned process. Also, identifying the problems and defining the measurable objectives and results are the most important objectives of this phase. The most desired result is to set a definitive vision, scope, and strategic approach for quality improvement operations.

Six deliverables has been produced in the Define phase:

1) Project charter and planning
2) Data collection
3) Stakeholder analysis, auditing and evaluation
4) Critical to Quality (CTQ) outline in MT
5) Overall overview of the process to be improved

4.2. Measure performance:

Measure performance phase focused on the distribution, collection, and refinement of MT. Planning for collection of the different measurements has been done in the Measure phase. It defines the imperfections of quality measurements, evaluate the "as is" process, and create a current-state assessment of the current service delivery. This phase will help the organization rank the potential causes of quality improvement, process improvement and productivity improvement, which would be useful in investigation through benchmarking the current process performance. This phase creates four deliverables as follows:

1. Process capability and performance
2. Critical input and proves variables that can affect output quality
3. Service delivery defects
4. Critical Success Factors (CTQ) summary chart.

4.3. Analyze factors impacting performance:

The Measure phase produces the baseline performance of the service delivery processes. Indeed, in this phase the collected data in the Measure phase have been examined to generate a high ranking list of the sources of variation in MT and identify the root cause of problems by using matrix diagram. The following deliverables has been formed in the Analyze phase:

1. Fishbone Diagram of problems
2. Frequency plots and graphs from different levels of MTs
3. Frequency of types of errors form different levels of MTs
4. Data and information flow diagram
5. Affinity diagram for Brainstorming
6. Tree Diagram for Affinity Diagram
7. Prioritization Metrics
8. Attribute Agreement Analysis (AAA)
9. Critical Success Factors (CTQs) benchmarked to identify opportunities for improvement;
10. Regression analysis of data.
11. Scatter plots and diagrams
12. Threats and opportunities

4.4 Improve performance:

The aim of improve performance phase is to identify some options for solutions which can be useful for the identified problems during analysis phase. So, the alternative policies could be identified and select for future improvement. Recommendation and implementation of the solutions are the most important objectives of this phase. In this phase mainly following deliverables has been produced:

1) Data and information flow diagram;
2) Risk Assessment;
3) Design of different experiments
4) Ranking different solutions;
5) Improvement planning for quality improvements.

4.5. Control performance:

The problem has been assessed and an improvement process put in place, putting a solution in place can fix problems for the moment, but the work in this phase is designed to ensure the problem stays fixed and secure. Also, the obtained knowledge in the improvement project can be consulted in other areas to help accelerate improvements of service delivery. The following deliverables would be obtained in this phase:

1. Control charts for quality improvement
2. Quality control process charts

3. Standardization charts for quality
4. Process metrics defined and implemented in MT
5. Control Plan implemented
6. Risk mitigation actions complete and implemented

5. Results and Discussion

Six-sigma has been a significant and most effective tool in manufacturing industries to rejection rates and to enhance productivity, process and quality. The MT is divergent from manufacturing industries and features are different. Thus, the use of Six sigma in MT and its benefits are vast to identify the six sigma projects. From the analyses of the service models, MT processes and also by comparing between the features of other service sectors, the main challenges in application of Six Sigma in MT can be identified. Further analyses of these challenges showed that the proper implementation of Six Sigma in MT requires not only the effective operational strategies, but also customers needs and satisfaction and internal customer satisfaction must be considered and designed into the implementation phase. The formation of Six sigma team of different role and responsibilities will be challenging. The green belt (MTs) or subject matter experts will play vital role in the six sigma projects MT.

Conclusion:

The Global Market is becoming more and more Quality Conscious. To compete in such an environment, companies need to adopt an efficient technique that can assess and take a diagnostic approach to meet customer needs and expectations. Nowadays, the industrial world has realized that the Six Sigma Philosophy is certainly a viable solution to their foundry problems. Six Sigma with DMAIC as a problem solving method, DMAIC is applicable to empirical problems ranging from well-structured to semi-structured, but not to ill-structured problems. By adaptation of DMAIC methodology in the processes can help to identify six sigma projects. The DMAIC procedure helps a user to find a strategy for analyzing and solving a problem, and thus structure the problem at hand. The organization implements Six Sigma methodology and the DMAIC problem solving approach should be aware of their characteristics and potential limitations. The future study can be carried how DMAIC-methodology can be adopted in above identified six sigma projects.

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